NOTES 15: MORE ON TESTING

Stat 120 | Fall 2025
Prof Amanda Luby

	H_0 True	H_0 False
Reject H_0		
Do not reject H_0		

> **Type I Error**
>
> Rejecting H_0 when H_0 is true

> **Type II Error**
>
> Failing to reject H_0 when H_0 is false

> **α (Significance Level)**
>
> The probability of making a Type I error is α (which we get to decide.)

> **β**
>
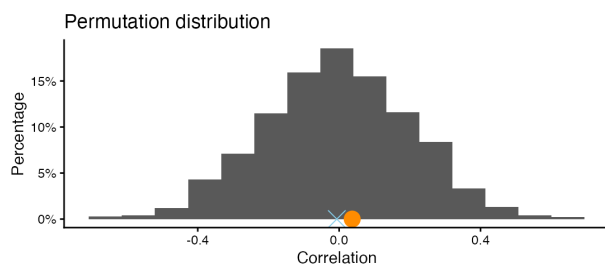> The probability of making a Type II error

> **Power**
>
> The probability of rejecting H_0 when H_0 is false (High power = good, low power = bad). Equal to $1 - \beta$

Example: A public health researcher believes that there is a positive relationship between heart rate and age among ICU patients. Data from 23 patients gives $r = 0.037$. Do you think the probability of a Type II error is higher if $\rho = .9$ or $\rho = .1$?

$H_0 : \rho = 0$

$H_A : \rho > 0$

Permutation distribution

1

Big Picture Picture

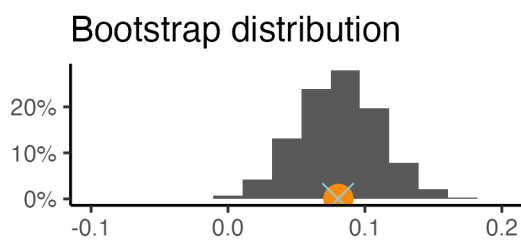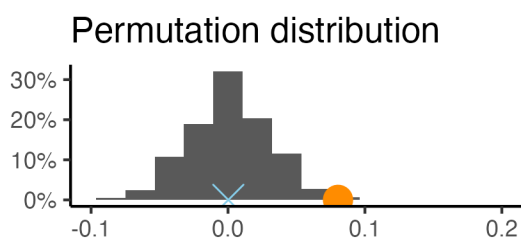**Sampling Distribution**   **Bootstrap Distribution**   **Null Distribution**

Connection to Confidence Intervals

If the value of H_0 is *outside* of the confidence interval, we _____.

If the value of H_0 is *inside* the confidence interval, we _____.

Illustration: (Social Media Poll Example)

Permutation distribution

Bootstrap distribution

1 Statistical vs Practical Significance

Example: Breaking news! I have a proven way to improve your exam scores! The difference in Exam 02 scores between students who do this and students who don't is statistically significant! All you have to do is come to every office hour, read each chapter of the textbook 5 times, and do every single problem in the book.

Parameter:

Sample Statistic:

> **Statistical vs Practical Significance**
>
> When making conclusions, it's important to consider **effect size** alongside *statistical significance*